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(54) Composition having peroxide compound and N-alkyl compound as bases and disinfecting process.

(57) This composition comprises at its solid state a peroxide compound, a N-alkyl compound and an acid passing the A test, for example the sorbic acid. Mixed with water, its has antimicrobial activity.

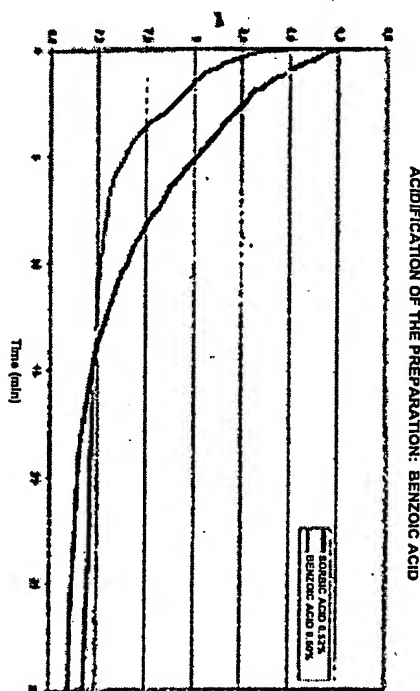


FIG 1A

Description

[0001] The present invention relates to compositions and processes for disinfecting especially objects or live or inert surfaces for example in the medical field.

[0002] In the international patent application WO 88/25468 a process for disinfecting medical instruments was described. A composition is prepared in two phases. In a first phase, oxygenated water or peroxide compounds which form oxygenated water in water, in aqueous alkaline medium reacts with N-alkyl compounds which form under these conditions, a peracid. In a second phase, the composition pH obtained in previous phase is lowered with the help of usual acids, this fact extraordinarily increases the antimicrobial efficacy, while having a weak corrosion.

[0003] This way of proceeding has two disadvantages. It is complicated and fastidious with the use of two successive operating phases. It is dangerous because it requires an acid transfer, precision of the transferred amount being also a source of difficulty.

[0004] The invention remedies these disadvantages with a composition which requires to be active only to pour water in one phase only.

[0005] The composition according to the invention is at solid state and comprises a peroxide compound, a N-alkyl compound capable of reacting in alkaline medium with the peroxide compound to form, with a perhydrolysis reaction, a peralkyl and an acid such as the solution S like the one defined in A test of the acid in question has, for a given pH value at the final equilibrium comprises between 7 and 7.9, difference of pH measured at instant $t = 30$ seconds and at instant $t = 30$ minutes is greater than 0.8.

[0006] In this composition the acid is surely water soluble, but its dissolution speed is slow and especially much slower than the speed to which the reaction occurs in aqueous and alkaline medium between the peroxide compound and N-alkyl compound. This reaction thus occurs while the acid is not yet dissolved or it just occurs and therefore has a basic pH especially between 11 to 8.0 where the reaction is well performed. After the reaction has enough time to complete, a slower dissolution of the acid according to the invention allows one to gradually lower the pH to bring it back to a value smaller than 8.0 (this value corresponds to pK_A of the peracetic acid) where biacid activity of the composition is the best.

[0007] According to a preferred embodiment of the invention, the acid is a mono- or di-alkanoic acid having a minimum of 4 carbon atoms and being solid at ambient temperature, a derivative of these acids, a behzoic acid, a derivative of the last acid or a mixture of these acids.

[0008] The peroxide compound may be an addition of oxygenated water and various supports that are also eventually designated as perhydrate. This may be an urea perhydrate, a sodium citrate perhydrate or a sodium carbonate perhydrate ($Na_2CO_3 \times 1.5 H_2O$) also usually designated as being of sodium percarbonate. It is also possible to use peroxy-mineral compounds which spontaneously hydrolyze water like the sodium perborate, especially the sodium perborate monohydrate and the sodium perborate tetrahydrate. It is particularly preferred to use, in the process according to the invention, the sodium perborate monohydrate. Of course, it is possible to use several peroxide compounds in mixture.

[0009] The N-alkyl compound used in the composition according to the invention is especially an alkyl compound which comprises, in nitrogen atom carrying the alkyl group, another keto group and/or wherein nitrogen atom is part of a heterocyclic system or supports two alkyl radicals. As suitable N-alkyl compounds, it is possible to mention several times alkylated alkoxylenediamine such as for example the tetraacetylenediamine, the alkyl glycolurine and especially the tetraacetylglycolurine, the N-alkyl hydantoin, the hydrazides, the triazoles, the triazides, the urazoles, the diketopiperazines, the sufurylamides, the lactames and the cyanurates. Very particularly, the tetraacetylene diamine (T.A.E.D) is preferred and also the tetraacetylglycolurine (T.A.G.U.) as well as the 1.5-diacetyl-2,4-dioxyhexahydro 1,3,5 triazine (D.A.D.H.). It is also possible to use several N-alkyl compounds.

[0010] Monoalkanoic or dialkanoic acid which may be used, is solid at ambient temperature or at least at the temperature where the disinfecting solution is prepared by pouring water into the composition according to the invention and whose dissolution speed is slow. Following acids: dialkanoic acids and especially sorbic acid or trans, trans-2,2'-hexadienoic acid are very particularly preferred.

[0011] It is possible to add to the composition according to the invention useful additives for the use of this composition in view of disinfecting medical instruments. Especially, it is possible to add to it surfactants, complexing agents for fighting against water hardness, complexing agents of heavy ion metals and water soluble mineral salts.

[0012] It is especially possible to use corrosion inhibitors and surfactants. The amount of these additives may vary within very large limits but it does not usually over about 20% by weight and preferably 10% of the composition's total weight.

[0013] As surfactant it is possible to use anionic and non-anionic surfactants but also cationic and amphoteric surfactants. Anionic and non-anionic surfactants are preferred as well as mixtures of several surfactants of these

two classes. It is possible to especially mention the alkylbenzene sulfonates, the alkylsulfates which are sulfuric acid hemi-ester salts of long chain alcohol, the alkylethersulfates which are sulfuric acid hemi-esters of alkocyl alcohol and especially long chain ethoxyls of alkanesulfonates and olefinsulfonates. Anionic surfactants are preferably used in the form of sodium salts. Particularly suitable non-anionic surfactants are alkoxyated long chain alcohol, the sodium alkylbenzene sulfonates and the sodium alkylsulfates.

[0014] As a complexing agent of heavy metal ions, it is first envisaged the aminopolycarboxylic acids or their salts, for example the ethylenediamine tetraacetic acid, but also the aminophosphonic acids such as ethyl diaminetetracetic acids such as ethyldiaminetetramethylenephosphonic acid or also the hydroxyethanediphosphonic acid, or also the 1-hydroxyethylidene -1,1-diphosphonic acid and their salts.

[0015] It is also possible to add a coloring agent or a perfume. The composition comprises from 1.5 to 2.5 moles of N-alkyl compound for a mole of peroxide compound .

[0016] The composition according to the invention is used as follows. 90 to 99 parts by weight of water are poured into one part by weight of the composition and the mixture is allowed to react at least for 10 minutes and preferably for 15 minutes. To disinfect, the instruments are allowed to be immersed in the solution between 5 minutes and 1 hour depending on the infectious agents.

Definition of A test

[0017] The object of test A is to select the organic acids which allow the acidification of the reaction medium in only one phase according to the invention.

[0018] These acids must especially be of pH values lower than 8, where the biocide activity is the best.

[0019] Using slow stirring, the disinfecting composition is dissolved into water while measuring the evolution of pH value with time.

[0020] The base formula of mixture S for testing a given acid A is: TAED (Warwick) 0.3%, monohydrate perborate (Solvay) 0.4%, sodium lauryl sulfate (Cognis) 0.01%, benzotriazole (Société Chimique de Montville) 0.1%, tetrasodic salt of 1-hydroxyethylidene-1,1diphosphonic acid tetrasodic salt (Solutia) 0.1% acid x% and demineralized water qsp 100% (percentage being by weight) x is chosen such that the final solution pH at a theoretically infinite instant (once all acids were dissolved) is equal to a given value, here 7.9 and 7.0 for a volume of 500 ml of solution in water.

[0021] Determination of x may be done either with calculation on the basis of respective molecular weights and equilibrium equations and the mass, or with the experimental way by true and fault, especially dichotomical.

[0022] The test mixture S is introduced for a given acid in a beaker equipped with a triangular section magnet bar coated with PTFE (overall circle diameter = 12 cm). The beaker is placed in a magnetic stirrer adjusted to the speed of 100 rpm and the pH (neutral pH 763 Multi-Calimatic - Knick) electrode is positioned with its combined electrode pH/glass body temperature (Ag/AgCl) (Broblook Scientific). A defined amount of demineralized water is rapidly introduced (for a final volume of the 500 ml solution) and the chronometer is started. pH values are recorded during the operation. A characteristic curve is then obtained for a given final pH of the acid in question. Figures 1a to 7a show these characteristic curves respectively for benzoic acid, fumaric acid, salicylic acid, tiglic acid, phthalic acid, gallic acid, and p-hydroxybenzoic acid for a final pH of 7 and figures 1b to 7b show these same curves for the same acids for a final pH of 7.9. In all figures, the curve corresponding to sorbic acid is shown in bold and in fine line the curve of the given acid.

[0023] An acid passes the A test (i.e. suitable according to the invention) if the pH differences measured at 30 seconds and 30 minutes remain larger than 0.6.

[0024] Results of A test for acids whose characteristic curves are shown in figures may be summarized as follows:

final pH at 30 sec.	final pH at 30 min.
= 7.9	= 7.0

TESTED ACIDS	pH differences between 30 sec. and 30 min.	
SORBIC ACID	1.4	2.0
BENZOIC ACID	0.7	1.2
FUMARIC ACID	1.0	1.4
SALICYLIC ACID	0.6	0.8
TIGLIC ACID	1.3	2.2
PHTALIC ACID	1.2	2.1
GALLIC ACID	1.1	1.0
p-HYDROXYBENZOIC ACID	0.8	1.0

[0025] Percentage by weight of acids are indicated in figures, such as sorbic acid (0.52 %; 0.30 %*), benzoic acid (0.5 %; 0.32 %), fumaric acid (0.24 %; 0.16 %) salicylic acid (0.58 %; 0.34 %) tiglic acid (0.40 %; 0.33 %), phthalic acid (0.32 %; 0.21 %), gallic acid (0.37 %; 0.21 %) and p-hydroxybenzoic acid (0.58 %; 0.33 %), the first x value being 7 for a final pH and the second 7.9.

[0026] According to the invention, proposed compositions

- reduce the release of vapors, especially irritating, eventually other ingredients at the beginning or at the end such as acetic acid,
- are easily marketable thanks to the powder galenic formula stability, for a long period, under standardized storage conditions.
- during their use, allow one to reduce contact time necessary for obtaining an efficient treatment, especially against sporulated forms of bacteria,
- are effective within defined limits, during their use, thanks to a sufficient stability of their components, reduce better, during their use the reactivity of their components with iron and non-iron metals, and
- allow one to be able to choose an acid the most in adequation with a reaction of peroxide compounds with N-alkyl compounds having to react in alkaline medium, and capable of acidifying the reaction medium to desired pH once the reaction is well started.

Claims

1. Composition which is in solid state and which comprises:
 - a) a peroxide compound,
 - b) a N-alkyl compound suitable for reacting in aqueous alkaline medium with the peroxide compound to provide, with a perhydrolysis reaction, a perakyl.
 characterized by the fact that it comprises:
 - c) an acid such as S solution which is defined in the A test of the acid in question has, for a given pH equilibrium value comprises between 7 and 7.9, a difference of pH measured at instant t = 30 seconds and instant t = 30 minutes which is greater than 0.8.
2. Composition according to claim 1, characterized by the fact that the acid in c) is a mono or di-alkanoic having at least 4 carbon atoms and solid at ambient temperature, a benzoic acid, derivatives of these acids or mixtures of them.
3. Composition according to claim 1 or 2, characterized by the fact that the peroxide compound is the mono-hydrated sodium perborate.

* Should it be 0.50 % according to figure 1A

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4. Composition according to any one of previous claims, characterized by the fact that the N-alkyl compound is the tetra acetylenediamine.
5. Composition according to any one of previous claims, characterized by the fact that the acid in c) is the sorbic acid.
6. Composition according to any one of previous claims, characterized by the fact that it comprises for one mole of peroxide compound from 1.5 to 2.5 moles of N-alkyl compound.
7. Process for preparing an antimicrobial composition characterized by the fact that it consists of pouring from 90 to 99 parts by weight of water for one part by weight of the composition prepared according to the previous claims wherein said composition and of waiting for at least 10 minutes and preferably for 15 minutes before using the obtained solution for the destruction of infectious agents.
8. Use of a composition according to claims 1 to 8 for the destruction of infectious agent.

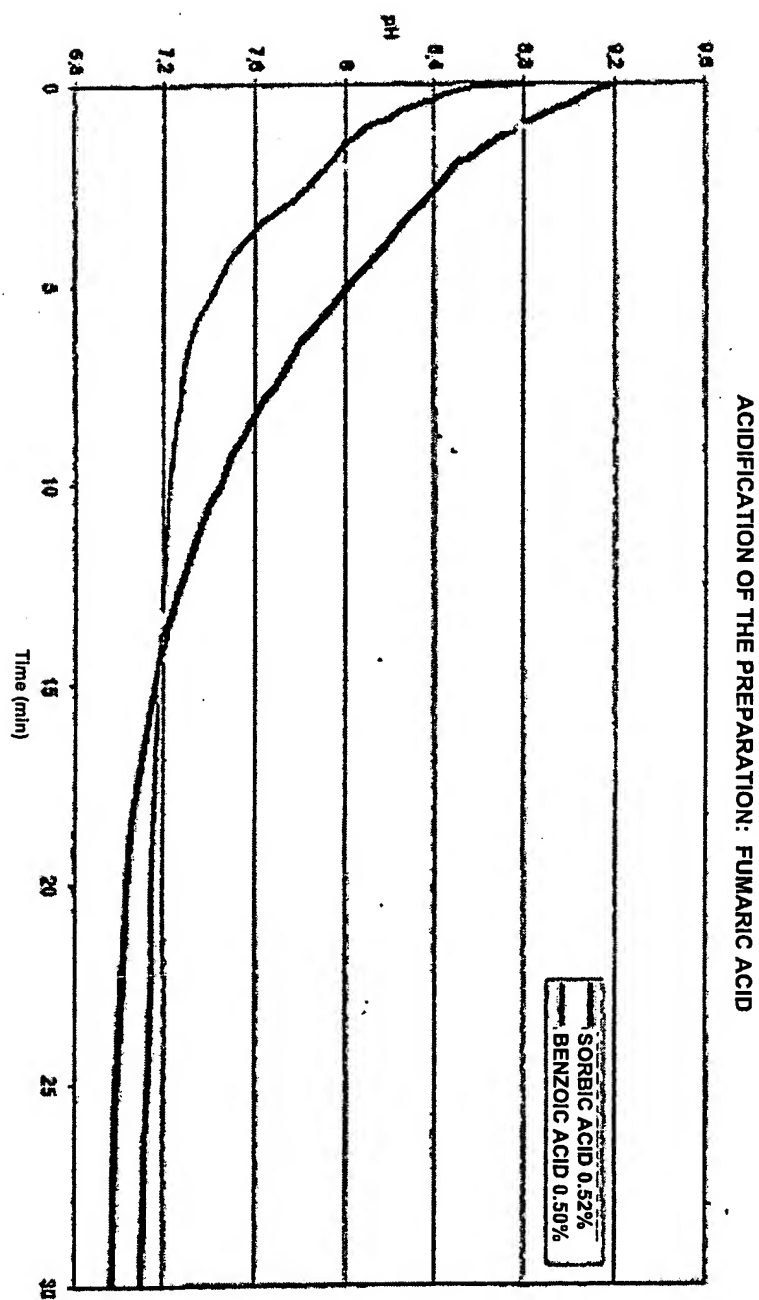


FIG 1A

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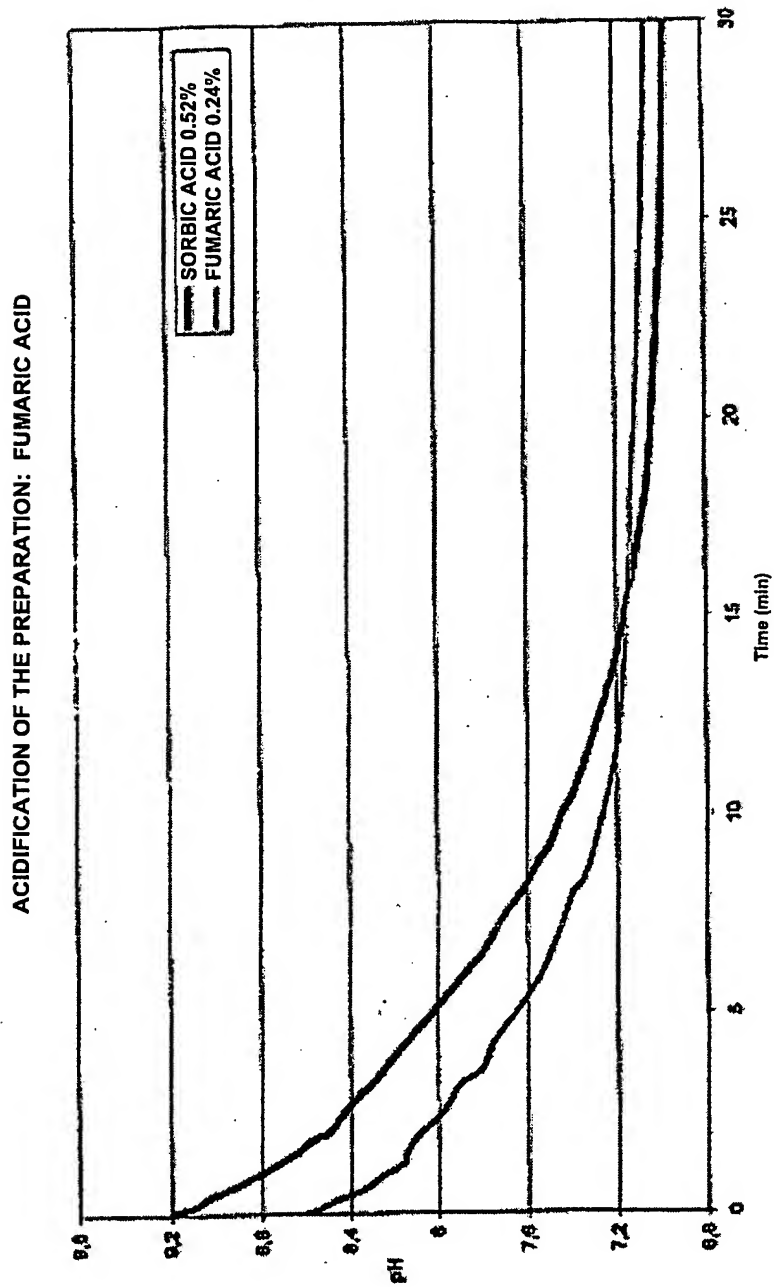


FIG. 2A

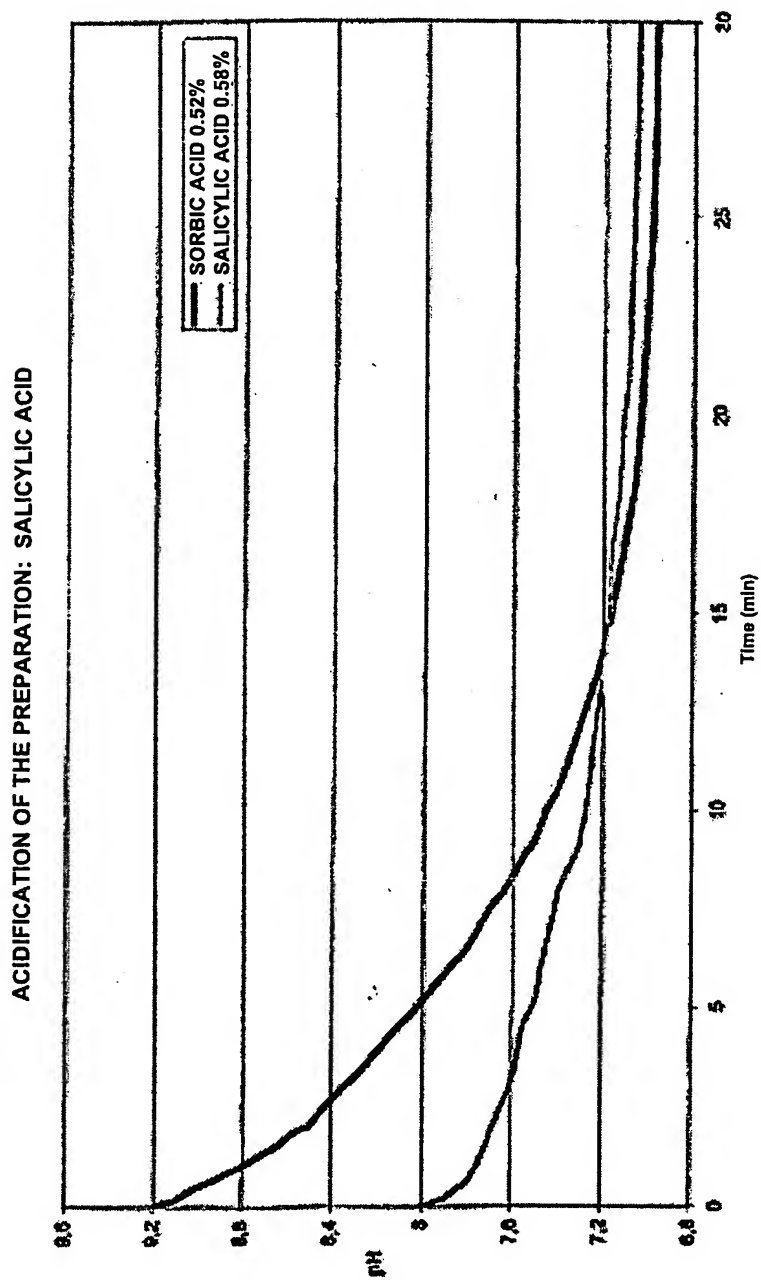


FIG. 3A

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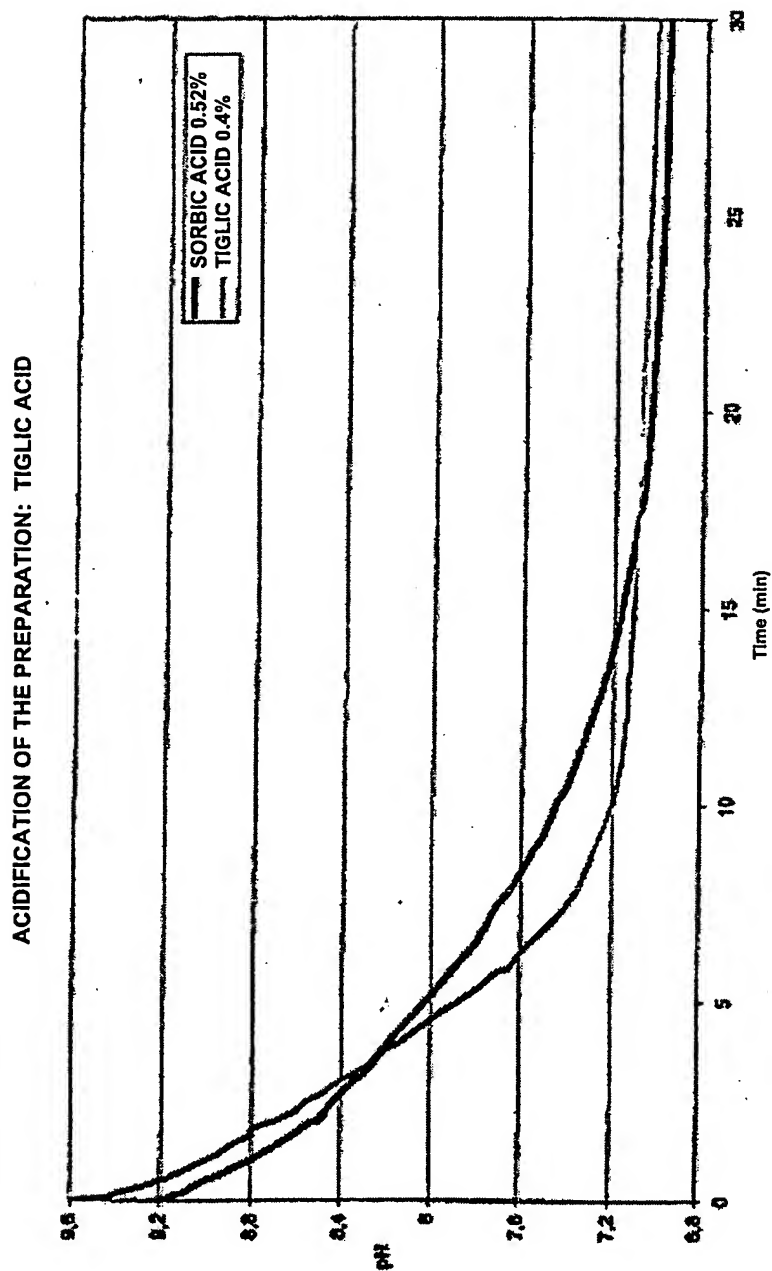


FIG. 4A

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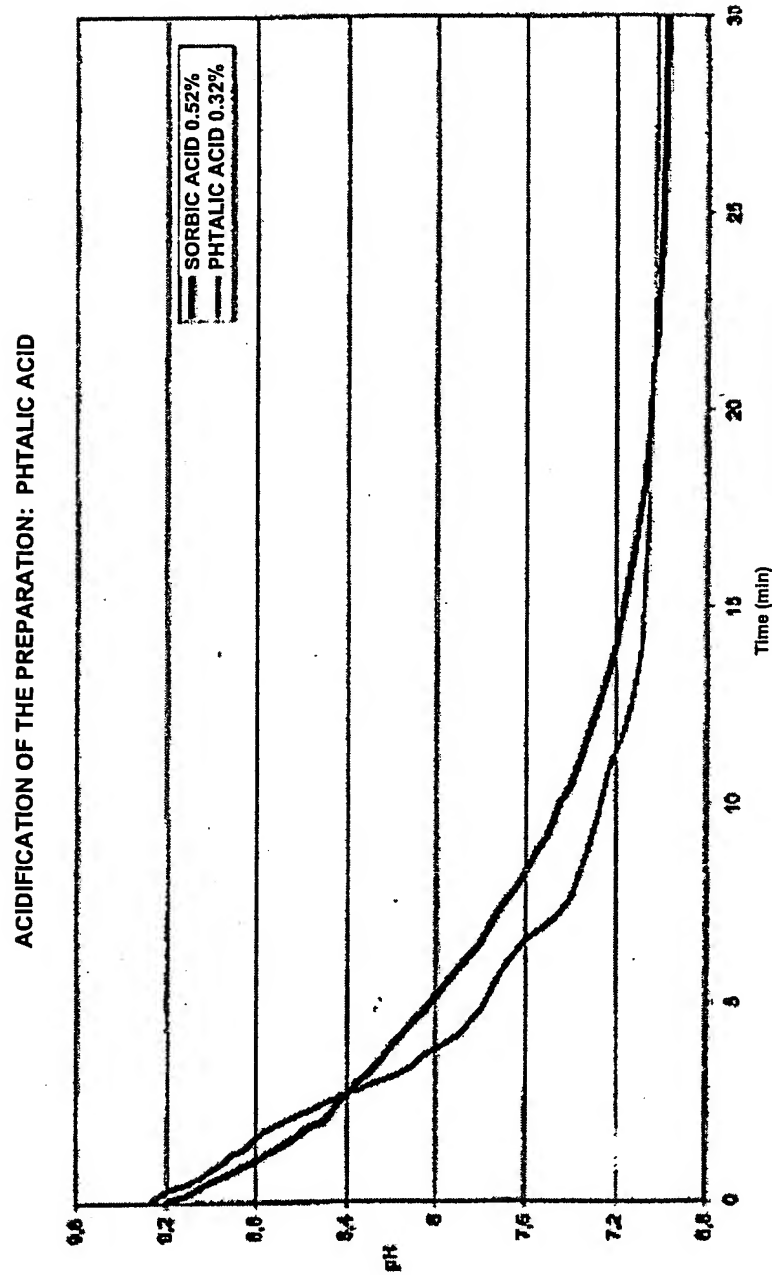


FIG. 5A

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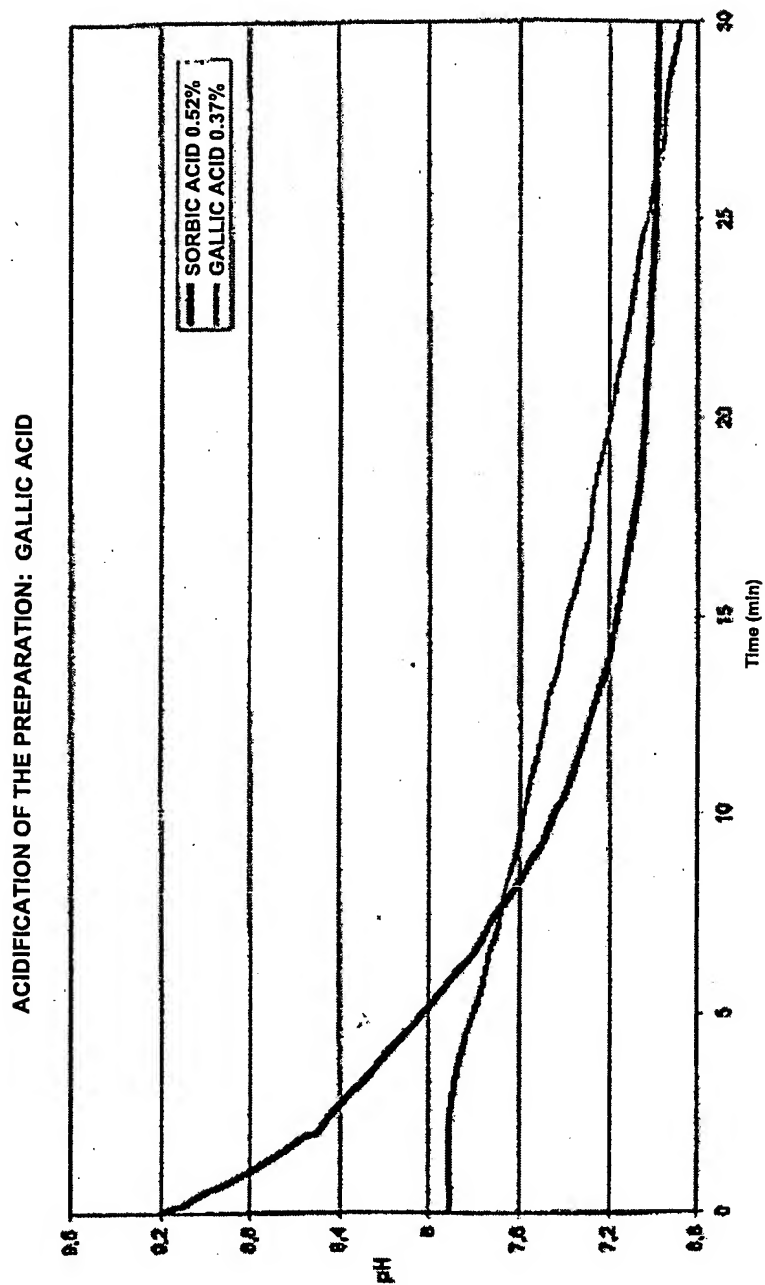


FIG. 6A

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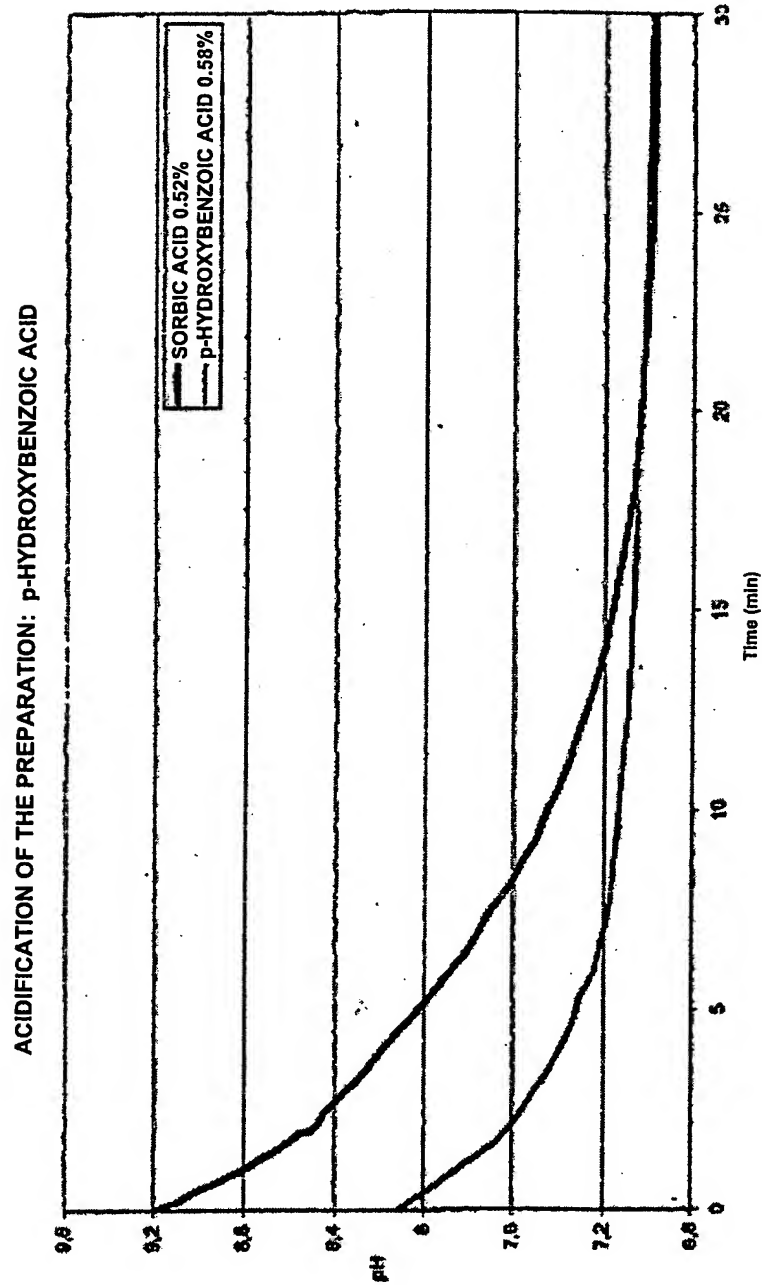


FIG. 7A

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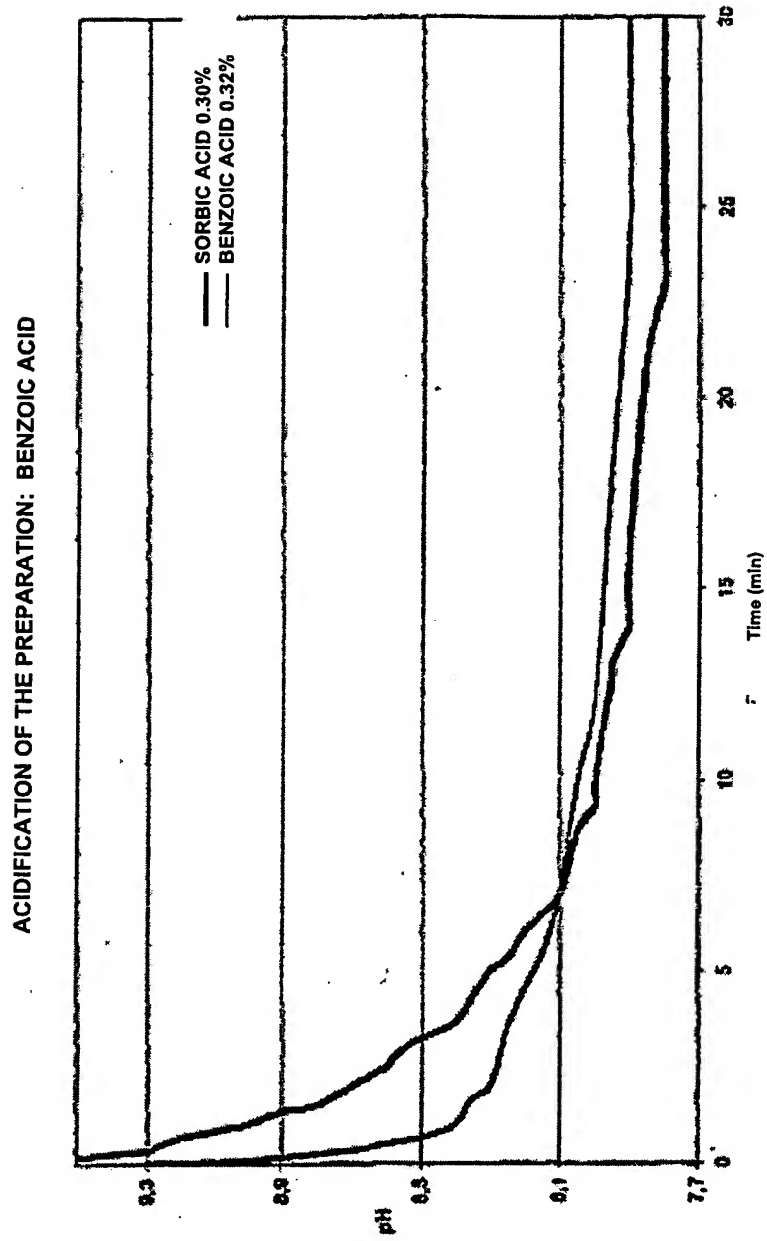


FIG. 1B

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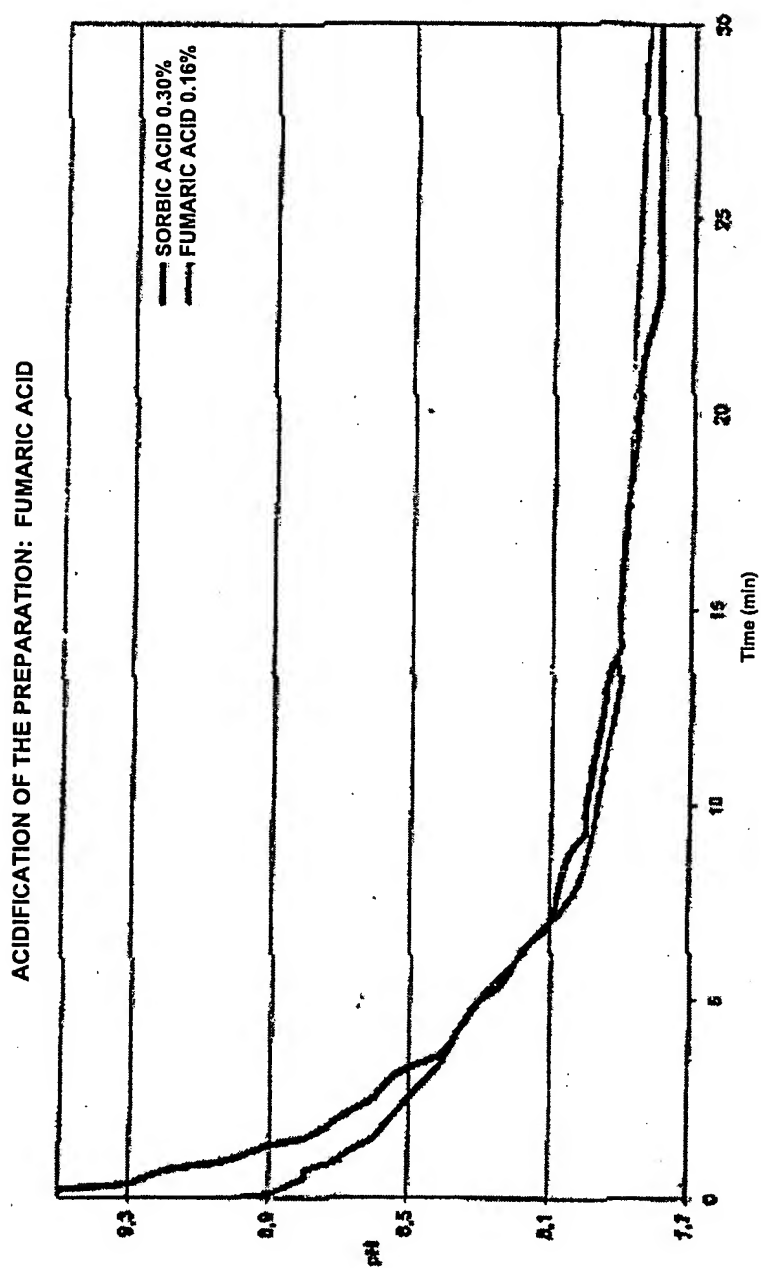


FIG. 2B

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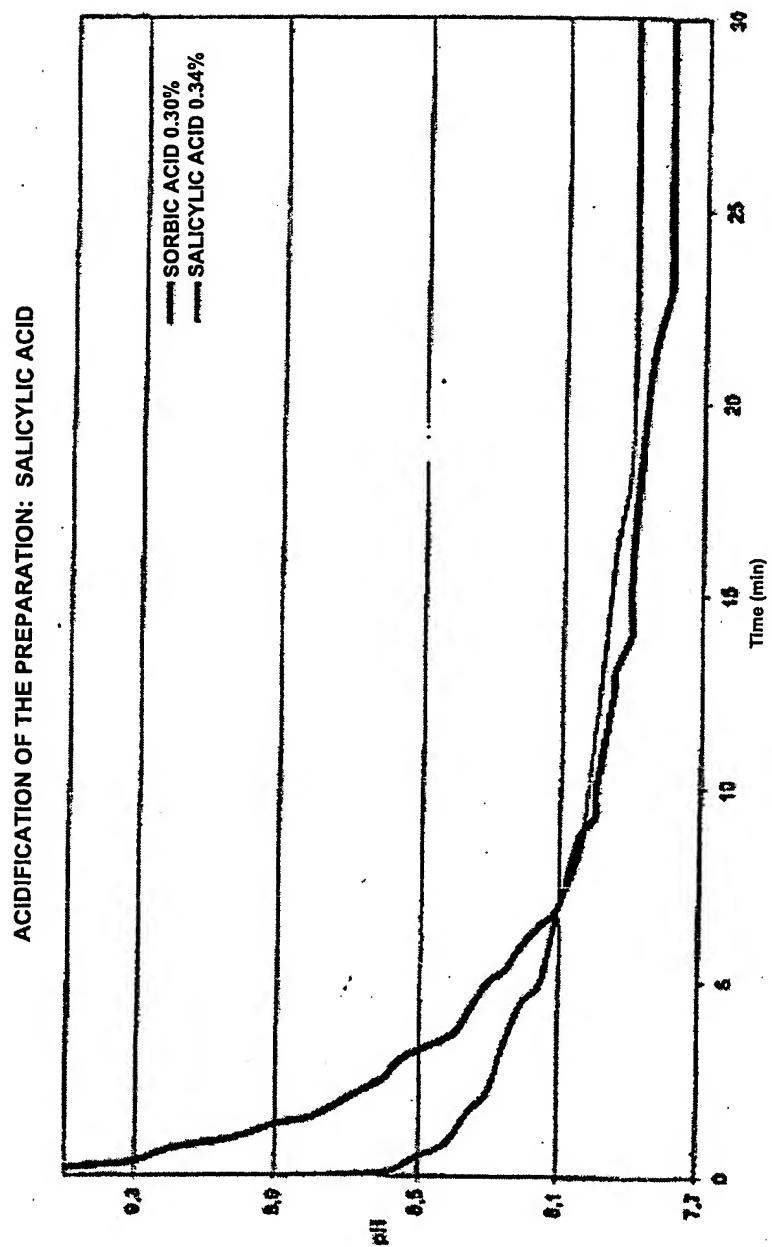


FIG. 3B

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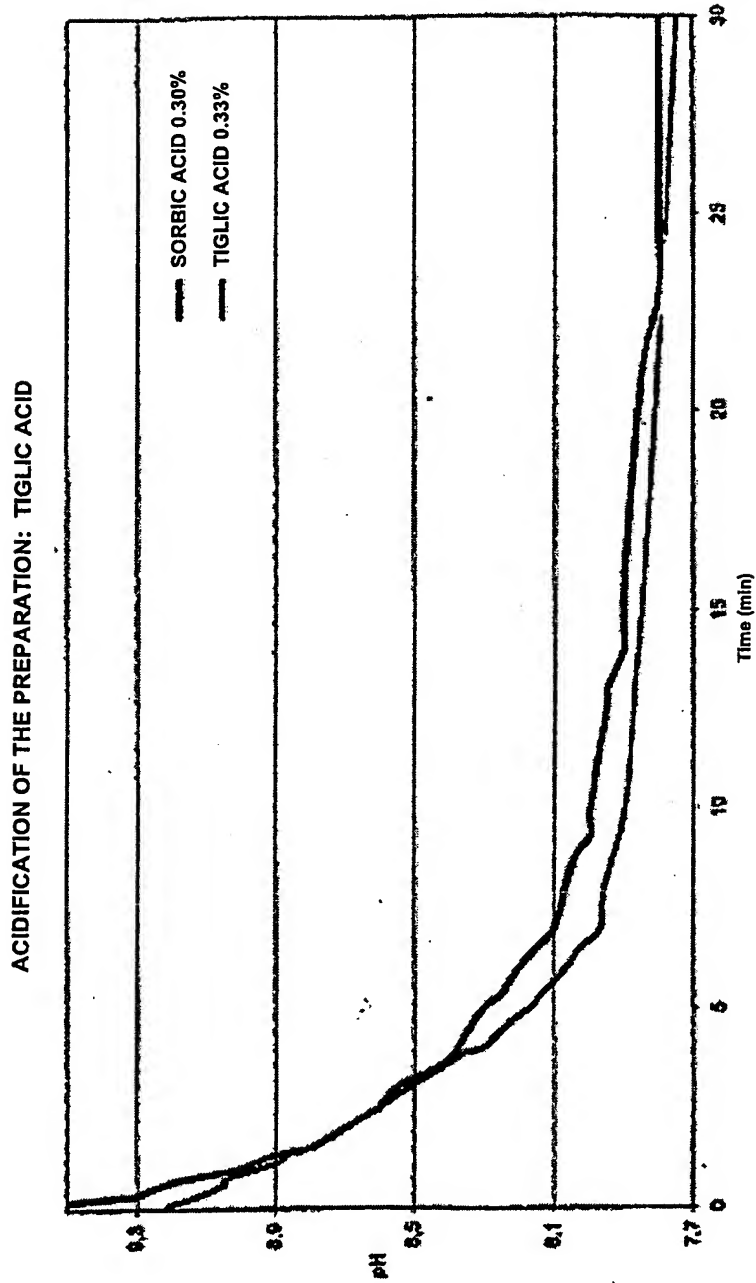


FIG. 4B

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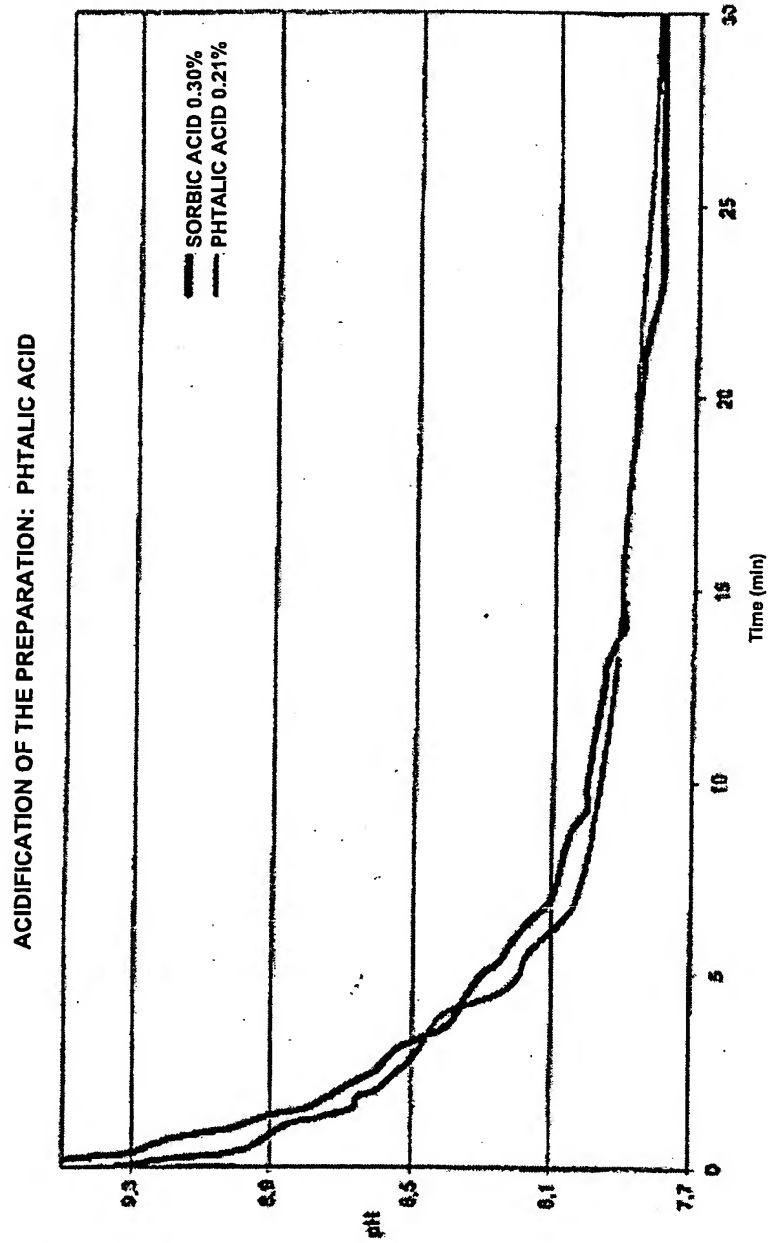


FIG. 5B

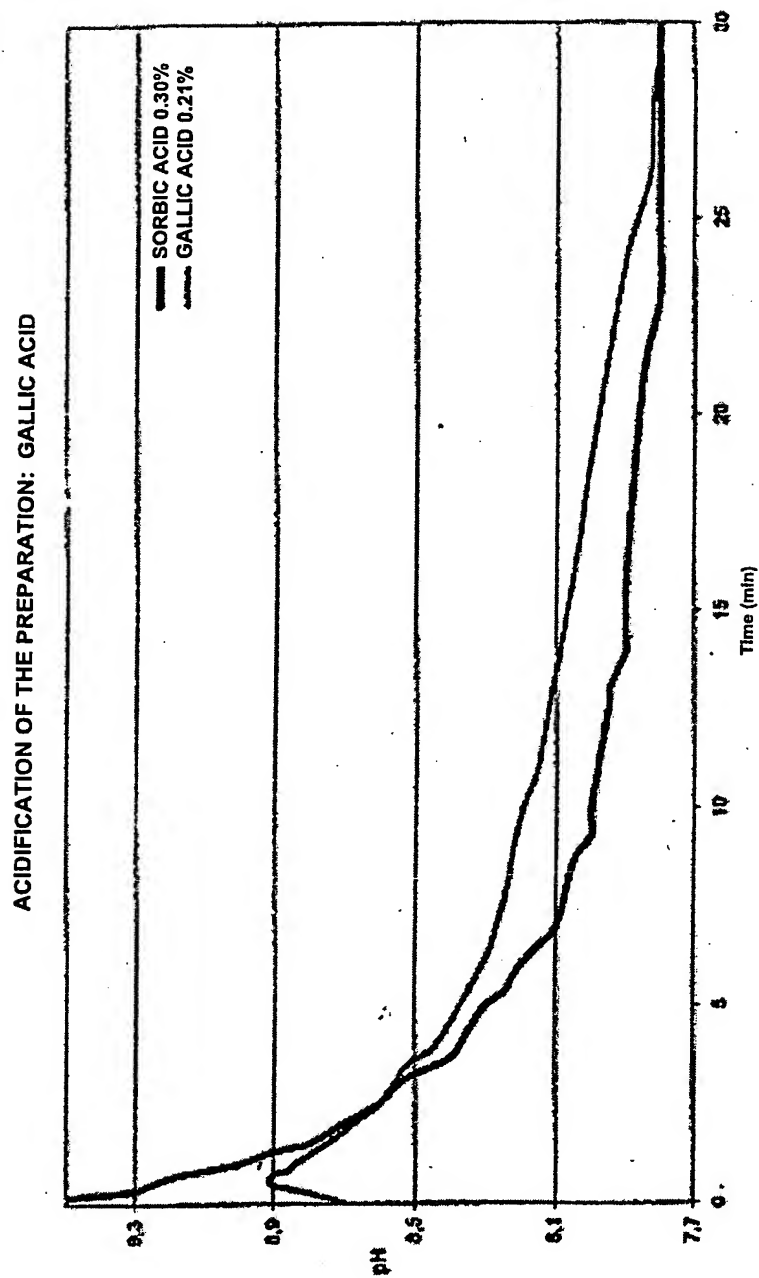


FIG. 6B

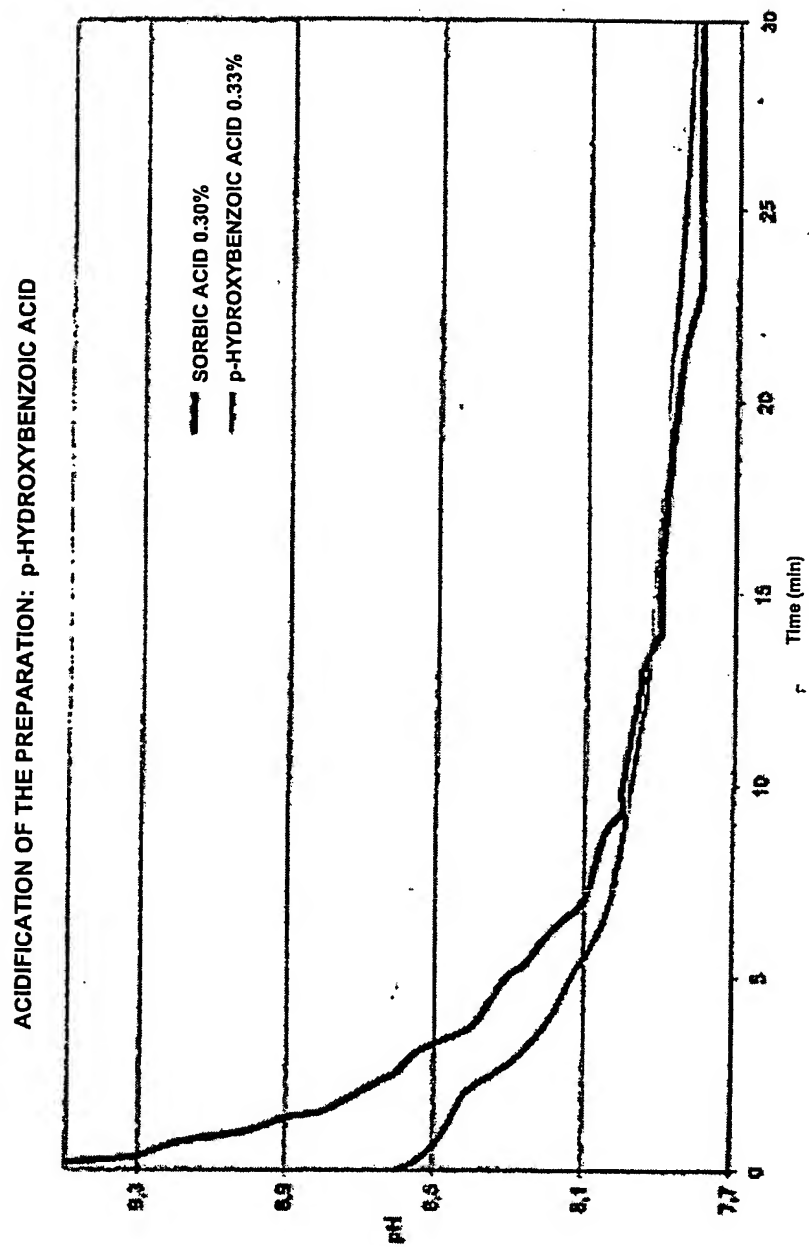


FIG. 7B



EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED AS RELEVANT			
Category	Citation of document, with indication, where appropriate, of the relevant parts	Relevant to claim No.	APPLICATION CLASSIFICATION (Int. Cl. ⁵)
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			SEARCHED TECHNICAL FIELDS (INT.CL. ⁵)
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The present report was established for all claims			
Place of search MUNICH		Search completion date September 12, 2002	Examiner Luethe, H
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